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Orthophoto Plat Pilot Project

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Branch of Cadastral Survey Development
Service Center
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Orthophoto Plat Pilot Project

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U.S. DEPARTMENT OF THE INTERIOR
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Service Center
1992

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
SERVICE CENTER
DENVER FEDERAL CENTER, BUILDING 50
P.O. BOX 25047
DENVER, COLORADO 80225-0047

In Reply Refer To:
9600 (SC-678)

August 13, 1992

Information Bulletin No. SC-92-246

To: All State Directors
Attn: Resource and Cadastral Survey Managers

From: Service Center Director

Subject: Final Report on Orthophoto Plat Pilot Project

The subject report is enclosed in a notebook entitled Orthophoto Plat Pilot Project. We request your comments on this report so as to help us determine the use of orthophoto plats as a tool in resource and cadastral survey management. This report completes the requirements directed to the Chief, Branch of Cadastral Survey Development (SC-678), for this project.

Under separate cover, an orthophoto plat of Silt, Colorado, overlain by the record Master Title Plat (MTP) plat and enlarged to the same scale as the orthophoto plat, is being forwarded for your evaluation. Please direct any questions or recommendations for the use of this new product to Doug Wilcox (SC-678) at (303) 236-0182.

Marcus LeBrun

1 Attachment
1 - Orthophoto Plat Pilot Project Notebook

Separate Cover:
Orthophoto Plat of Silt, Colorado

Distribution
ESO-960
SC-653, BLM Library
SC-657A, Reading File

ORTHOPHOTO PLAT PILOT PROJECT

FINAL REPORT

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ORTHOPHOTO PLAT PILOT PROJECT

FINAL REPORT

by Doug Wilcox
July, 1992

I. OBJECTIVE OF PILOT PROJECT

The objective is to make a comparison of the quality and cost of producing orthophotos by contract with the U.S. Geological Survey (USGS), within the Bureau of Land Management (BLM), and by private firm. Within BLM, the orthophoto plats were produced by the Alaska State Office, Branch of Mapping Sciences. Costs are reported for each test site and identified by the producer of the orthophoto plat. This "orthoplat" project is an attempt to demonstrate the usefulness of a concurrent by-product from on-going cadastral surveys. The concept is based on two factors: (1) the use of existing photography without relying on additional (new) flights; and (2) that for a small amount of added cost, during the survey, the photos will delineate boundaries for BLM managers to directly visualize appropriate spatial and topographic relationships.

II. DESCRIPTION OF TEST SITES

1. Colorado Site #1
   Valley View Hot Springs
   T.46 N., R.10E., New Mexico P.M., Sections 25 and 36.

This site is located in the north end of the San Luis Valley about 6.1 miles southeast of Villa Grove, Colorado, and about 3.5 miles east of U.S. Highway 285. Section 25 contains both rectangular and mineral surveys and extends up the west slope of the Sangre de Cristo Mountain Range. Section 36 consists of rectangular surveys and is located on the floor of the valley. The site is about 2 square miles in size and is located on the Valley View Hot Springs, Colorado, 7.5-Minute Series Topographic Map, No. N 3807.5 - W10545. The USGS Western Mapping Center (WMC) produced the orthophoto map with a scale of 1 inch equals 400 feet, and a contour interval of 10 feet. The orthophoto map was registered to the Colorado State Plane Coordinate System Central Zone. In addition, the WMC produced an experimental quadrangle for Valley Hot Springs, with no contours, at a scale of 1:4800.

2. Colorado Site #2
   Silt, Colorado
   T.5S., R.91W., 6th P.M., Sections 19, 20, 29, and 30.

This site is located approximately 3 miles north of Silt, Colorado, and is shown on two 7.5-Minute Series Topographic Maps.

They are Silt, Colorado, No. 39107-E6-TF-024 and New Castle, Colorado, No. 39107-E5-TF-024. The surveys are rectangular and on BLM lands which are adjacent to private lands and development. The terrain ranges from valley floors through rolling hills to steep mountains. This site was used as a test site in which an orthophoto plat was made by three different producers. They were the USGS; Alaska State Office, Branch of Mapping Sciences; and a private contractor. The Experimental Edition Orthophoto Plat produced by the USGS Rocky Mountain Mapping Center (RMMC) is entitled, "Site 2 Colorado Silt and New Castle Quadrangle, T 5S., R91W., Sections 19, 20, 29, and 30." There are no contours and the scale is 1:4800. The Silt site orthophoto plat, produced by the Alaska State Office, Branch of Mapping Sciences, is entitled, "Silt, Colorado, Township 5 South, Range 91 West, 6th P.M., Sections 19, 20, 29, and 30." The scale is 1:4800 and the contour interval is 10 feet. The Silt site orthophoto, produced by a private contractor, used the same photos and survey control as the Alaska State Office and the USGS RMMC. The orthophoto plat produced by the private contractor has a scale of 1:4800, a contour interval of 10 feet, and is registered to the Colorado State Plane Coordinate System.

3. Golden Gate National Recreation Area Site
   Marin County, California

This site is located in the area of Fort Baker, California, which is located in the southern part of the Marin County Peninsula. The Alaska State Office, Branch of Mapping Sciences, produced four orthophoto maps of this recreation area. They were designated Recreation Areas A, B, C, and D. Recreation Area A orthophoto map is of the main post at Fort Baker. This area is located about 0.3 miles north of the northern end of the San Francisco Golden Gate Bridge. Areas B, C, and D extend to the south of Fort Baker to end at the northern end of the Golden Gate Bridge. The site is shown on the U.S. Geological Survey San Francisco North Quadrangle 7.5-Minute Series Topographic Map, No. N 3745 W12222.5. All area maps were produced at a scale of 1:2400 with a contour interval of 40 feet. The total site area is about 4 square miles in size. The orthophoto maps were registered to the California State Plane Coordinate System. The purpose of producing orthophotos of the area within the boundary of Fort Baker was to show how an orthophoto could be produced in an area of steep terrain. Unfortunately, the boundary of the reservation does not show on the orthophoto. However, the orthophotos are trimmed to show this boundary and contours are limited to the area within the boundary. If you mosaic all four orthophotos together, you will create an orthophoto which covers the entire area of Fort Baker. The western two orthophoto area is now a part of the Golden Gate National Recreational Area.

4. South Lake Tahoe Site
South Lake Tahoe, California
T.12N.,R.18E., Mount Diablo P.M., Section 2

This site is located in the southern part of South Lake Tahoe, California, along the Pioneer Trail. The surveys are rectangular with land development. The site is about 1 mile from east to west and 2 miles from the north to south in size, and is located on the South Lake Tahoe, California-Nevada 7.5-Minute Series Topographic Map, No. N 3852.5 W11952.5. The USGS National Mapping Center produced the orthophoto plat for this site at a scale of 1:4800 and a contour interval of 5 feet. The RMMC advised BLM that the photography supplied to them by BLM was of a poor quality. The color photography used by USGS was flown by the U.S. Department of Agriculture in 1983, with additional black and white photography flown by the California Highway Department in 1981. No new photography was flown by BLM or USGS for this site. The orthophoto plat was registered to the California State Plane Coordinate System.

III. ORTHOPHOTO PLAT PRODUCTION COSTS

The RMMC advised BLM that their original estimates were given without the benefit of the possession of source photography, boundaries, or Public Land Survey System (PLSS) data. Because the exact number of stereo models was unknown, the costs given by them were only rough estimates. The total BLM cost to USGS for producing the three orthophoto plats was $16,400. The production time required was 448.25 hours. This computes to an average of $36.29 per hour. This value was used in this report in the approximate cost computations for each orthophoto plat.

Alaska State Office costs were computed for an average GS-11, Step 1 pay, plus 25 percent pay differential for Alaska duty. Photo paper and mylar copy costs were an additional $111 per site, and this amount was added to the other costs.

ORTHOPHOTO PLAT PRODUCTION COSTS

U.S. Geological Survey, RMMC

TEST SITES	TIME	COST
Colorado Test Site #1	338 hrs	$12,376.00
Colorado Test Site #2	46 hrs	$1,683.00
South Lake Tahoe	64 hrs	$2.341.00
Alaska State Office, BLM		
Colorado Test Site #2	152 hrs	$2,944.28
Golden Gate Recreation Area	200 hrs	$3,839.00
Private Contractor (American Reprographics, Inc.)		
Colorado Test Site #2	80 hrs	$1,855.00

Table 1

IV. PHOTO CONTROL AND GPS SURVEYING COSTS

These costs include costs for reconnaissance, photo control, and GPS control surveying.

PHOTO CONTROL AND GPS SURVEYING COSTS

TEST SITES	TIME	COST
Colorado Test Site #1	69 hrs	$800.87
Colorado Test Site #2	139 hrs	$1,599.01
South Lake Tahoe	78 hrs	$1,182.26
Golden Gate Recreation Area	72 hrs	$1,427.04

Table 2

V. TOTAL TIME AND COST

Table 3 totals are the sum of Table 1 and Table 2 similar site values.

TOTAL TIME AND COST

TEST SITES	TIME	COST
Colorado Test Site #1		
RMMC	407 hrs	$13,176.87
Colorado Test Site #2		
RMMC	185 hrs	$3,282.01
BLM	291 hrs	$4,543.29
Private Contractor	219 hrs	$3,454.01
South Lake Tahoe		
RMMC	142 hrs	$3,523.56
Golden Gate Recreation Area		
BLM	272 hrs	$5,266.04

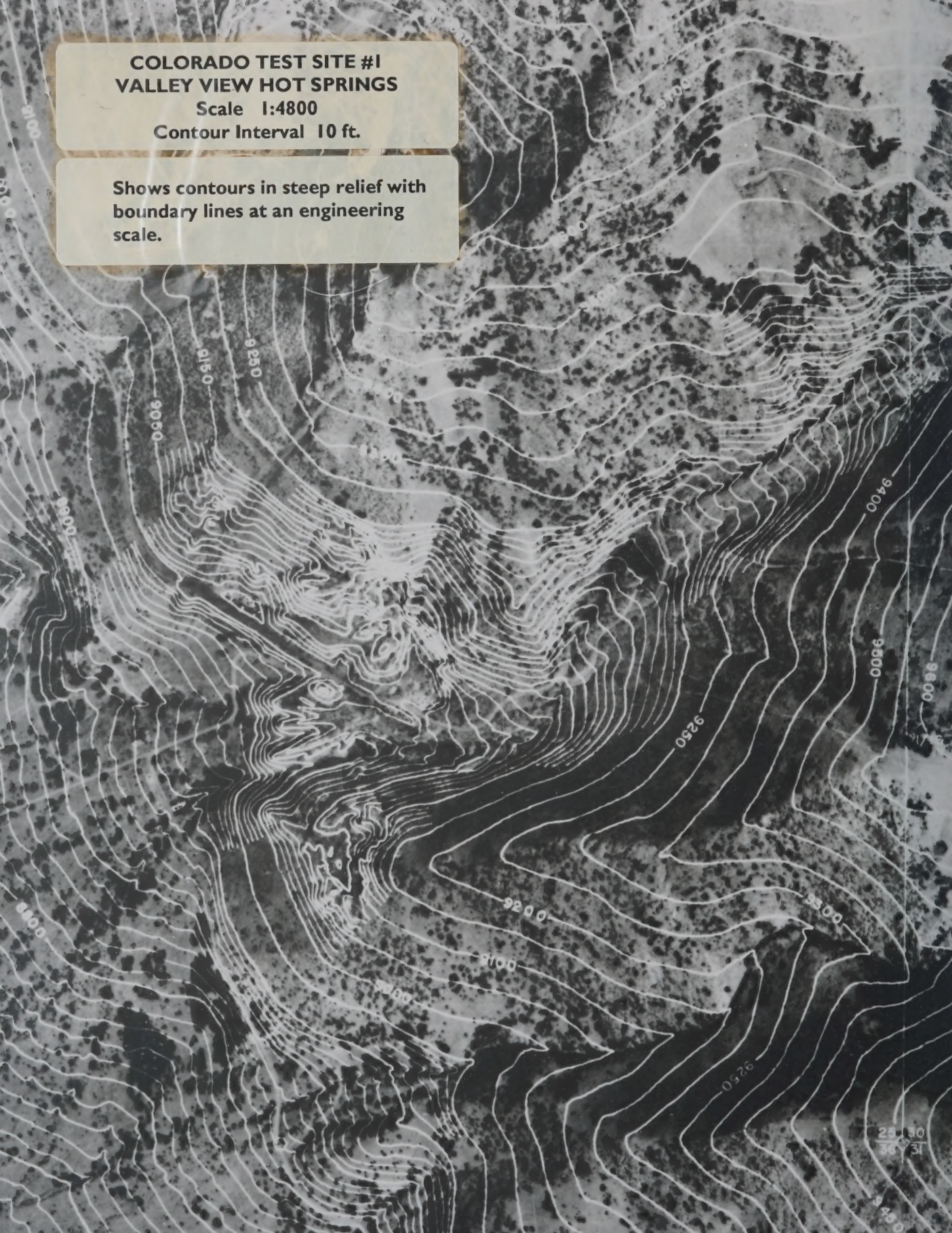
Table 3

VI. RECOMMENDATIONS

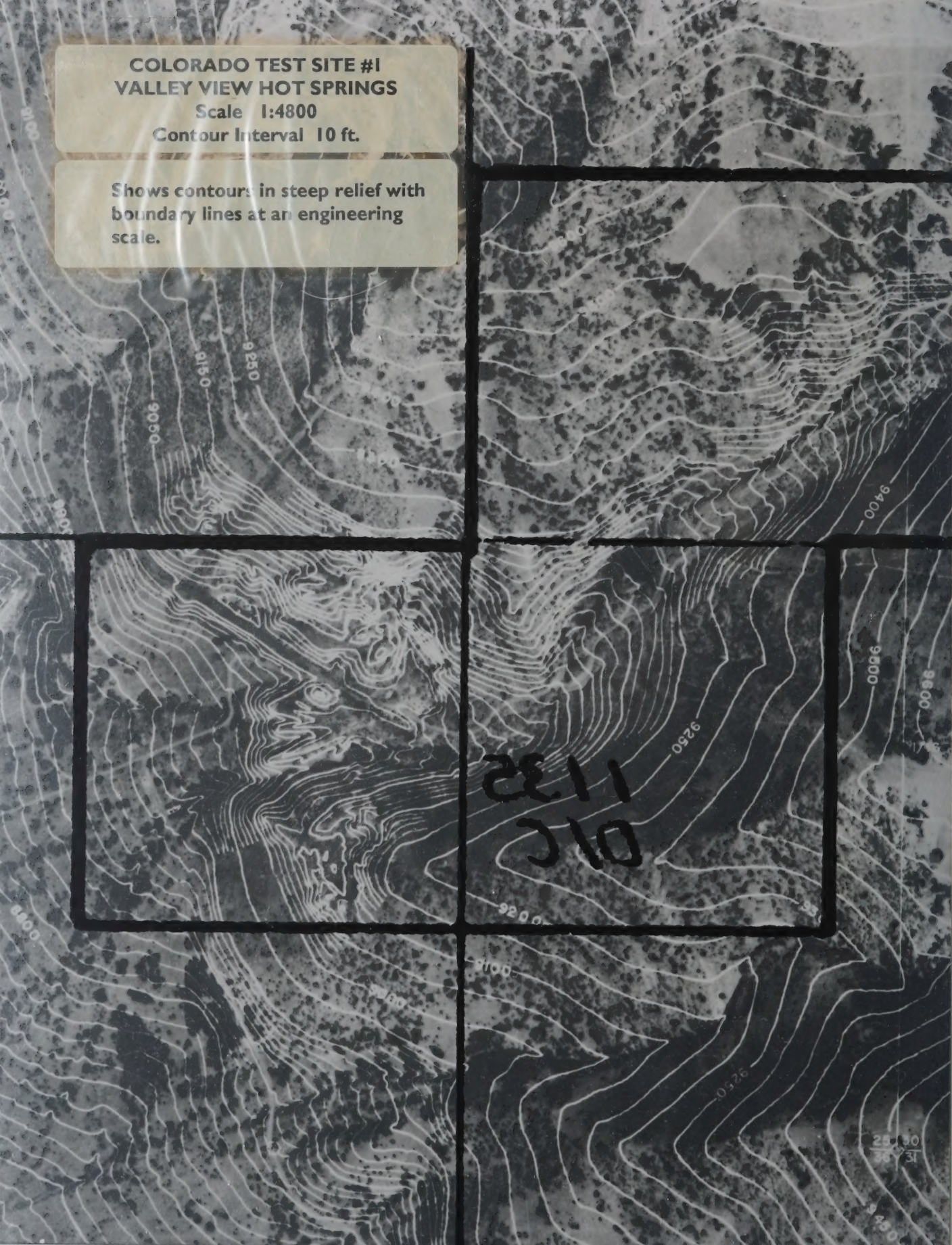
1. The orthophoto plat should be combined with our current Master Title Plat (MTP) as is done in the Alaska State Office. An example of this use is the MTP for T1N., R2W., Fairbanks Meridian. This current combination should be called an Orthophoto MTP. It is estimated that it would cost about $65 for the materials and labor to photographically combine an MTP with an orthophoto plat.

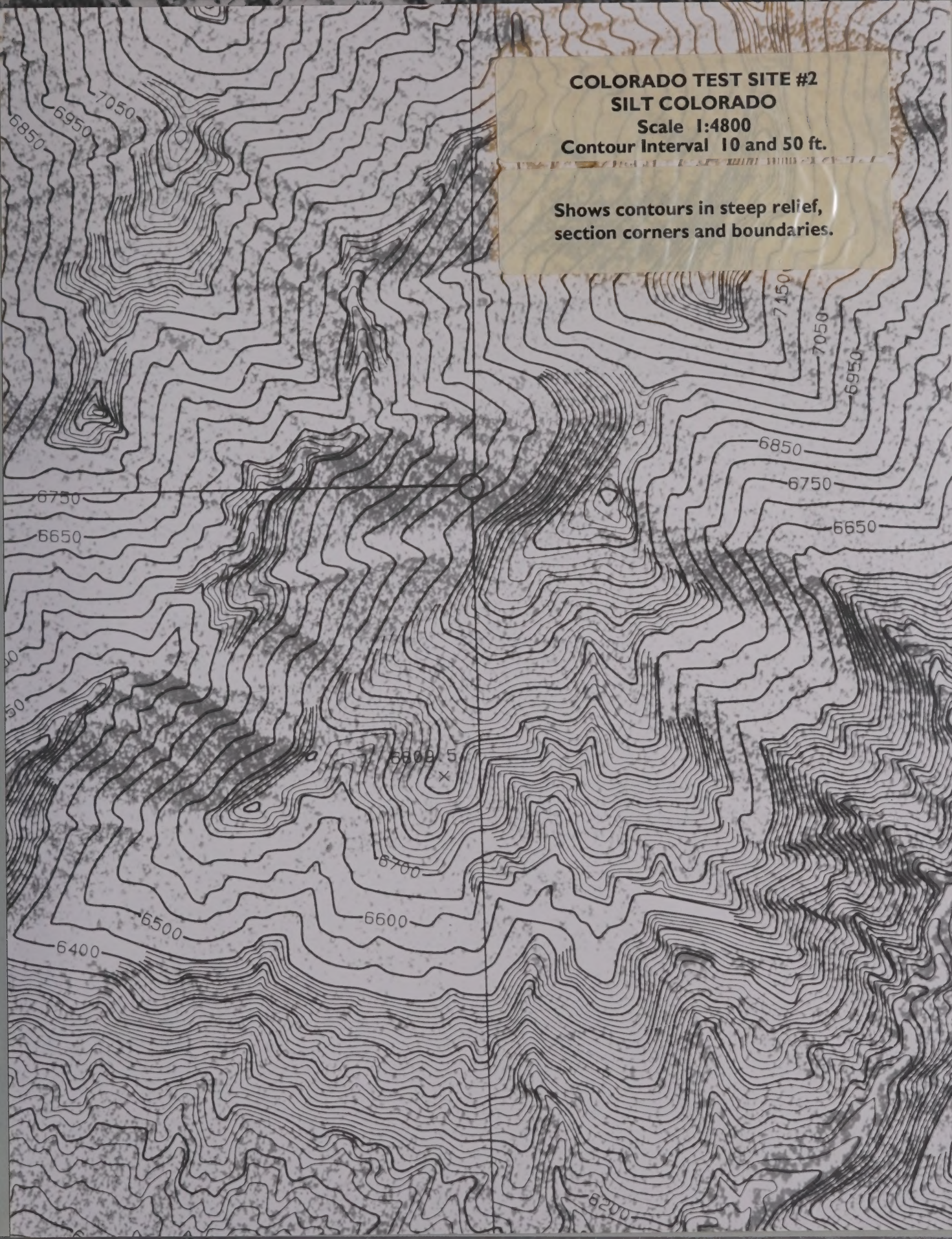
2. We should add contours to the current Alaska Orthophoto MTP and register it to the Alaska State Plane Coordinate System in order to make it more useful to BLM resource managers. This combination should be called an Orthophoto Map MTP.

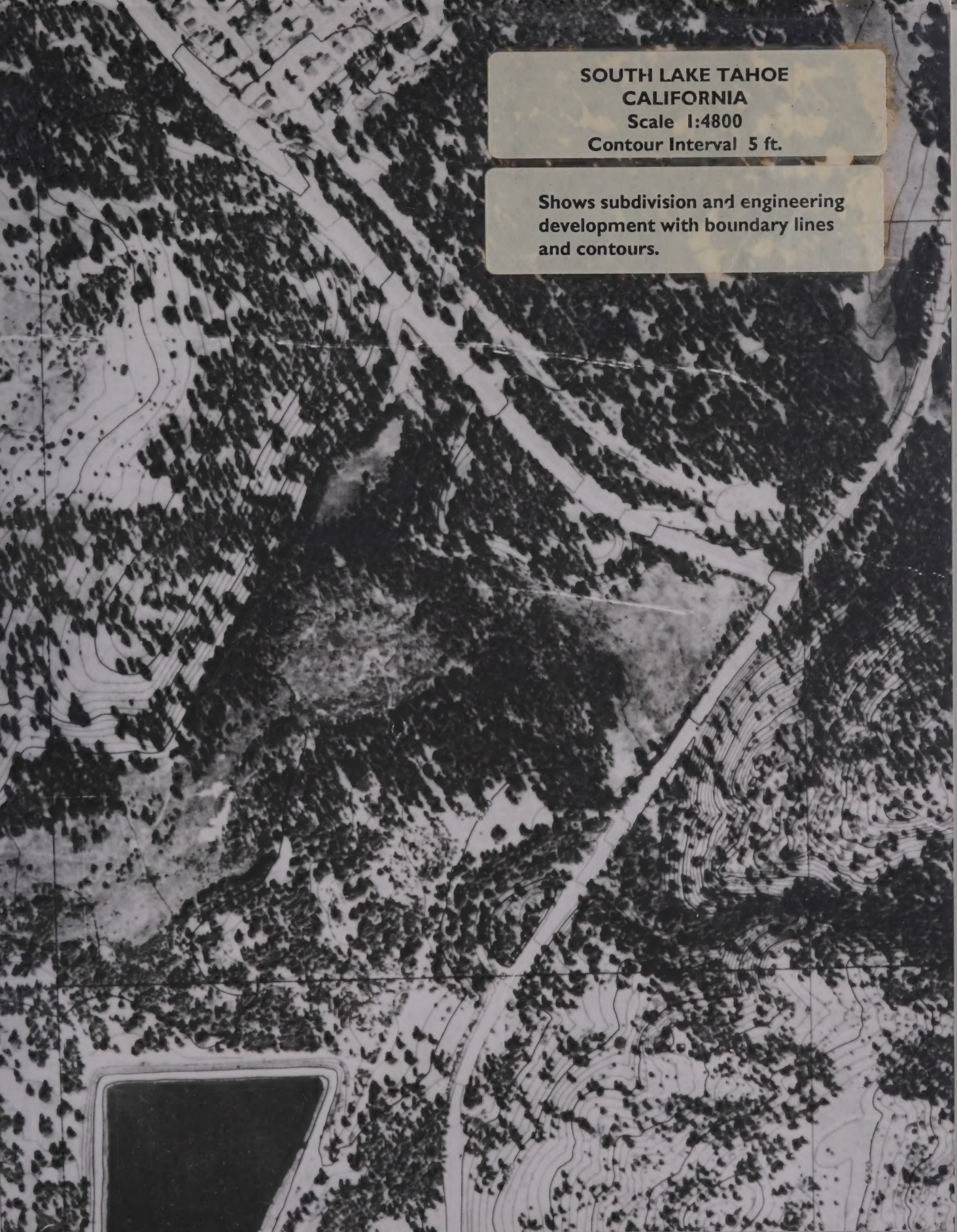
3. Creation of an Orthophoto Map MTP as a new cadastral survey product would result in a new BLM management tool. New users of this product will consist of range conservationists; planners; land managers; law enforcement personnel; and wilderness area, mining, recreation, and engineering specialists.

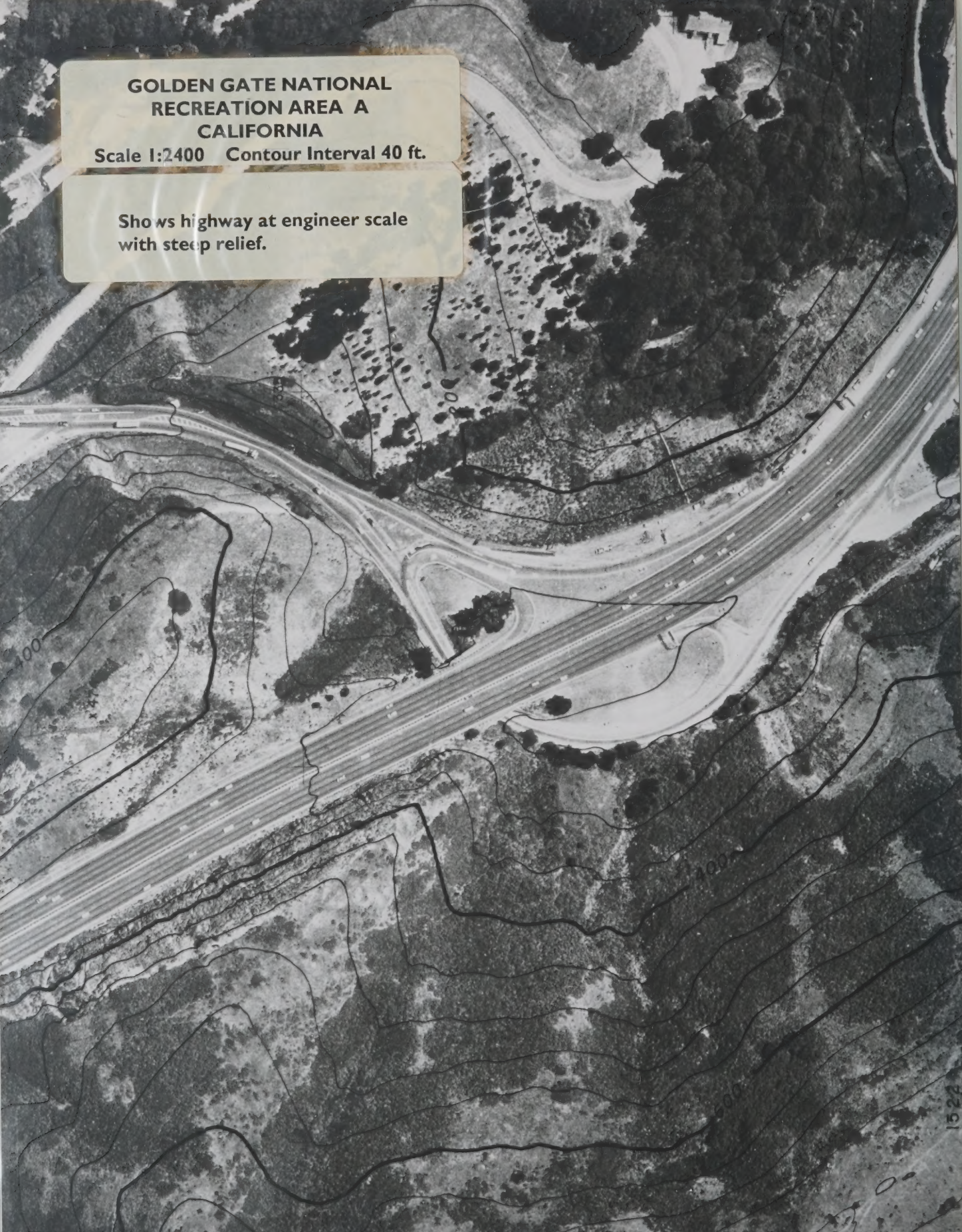

COLORADO TEST SITE #1
VALLEY VIEW HOT SPRINGS
Scale 1:4800
Contour Interval 10 ft.
Shows contours in steep relief with boundary lines at an engineering scale.
9100
9150
9250
9000
9400
9600
9800
9200
9300
9250

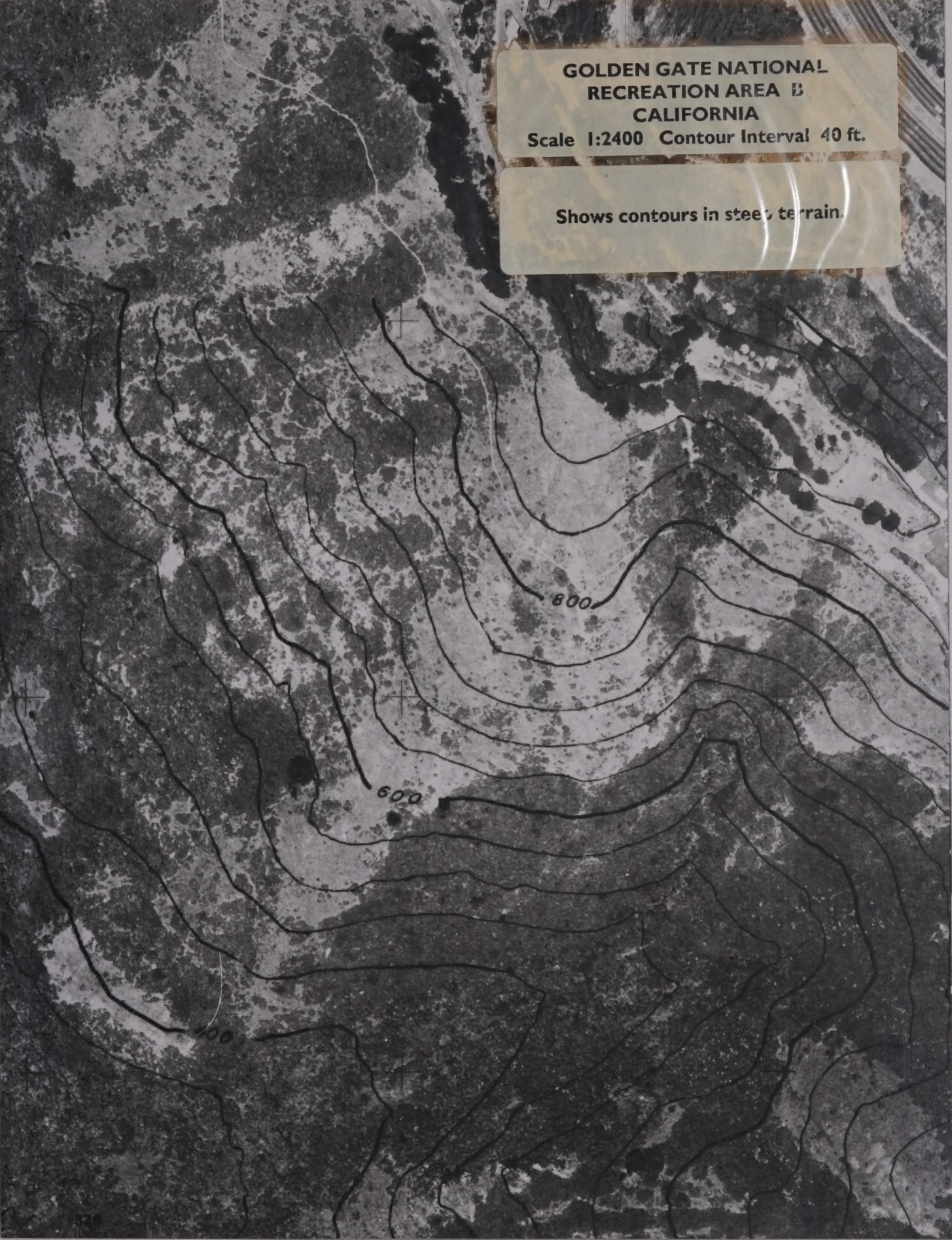
COLORADO TEST SITE #2
SILT COLORADO
Scale 1:4800
Contour Interval 10 and 50 ft.
Shows contours in steep relief, section corners and boundaries.
7050
6950
6850
6750
7150
6400
6200
1135
D1C

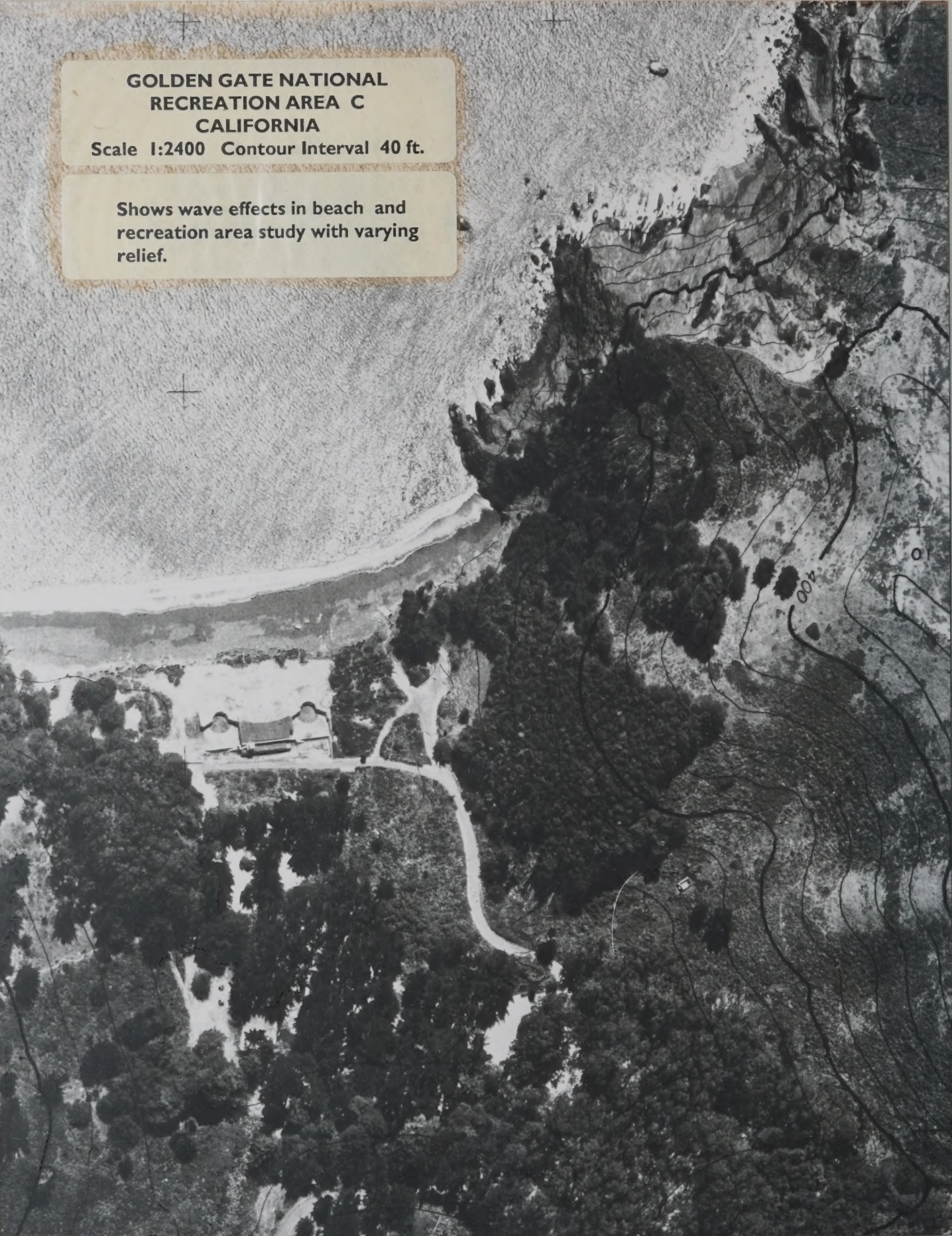

COLORADO TEST SITE #1
VALLEY VIEW HOT SPRINGS
Scale 1:4800
Contour Interval 10 ft.
Shows contours in steep relief with boundary lines at an engineering scale.
9400
9250
9200
9000
8800
9250
9250
25
36
30
31

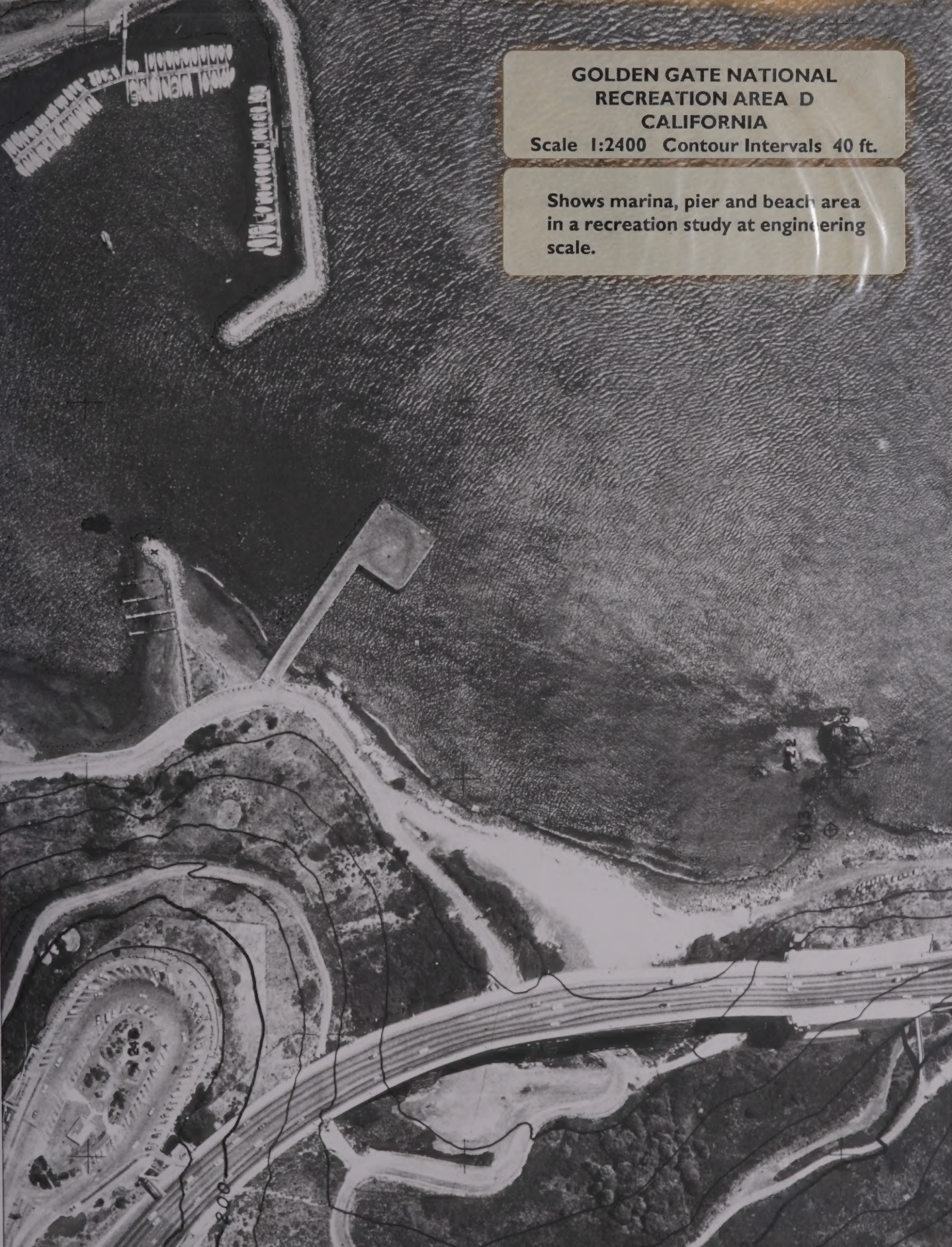

COLORADO TEST SITE #2
SILT COLORADO
Scale 1:4800
Contour Interval 10 and 50 ft.
Shows contours in steep relief, section corners and boundaries.
7050
6950
6850
6750
6650
6600
6500
6400
6700
6800
7150


SOUTH LAKE TAHOE
CALIFORNIA
Scale 1:4800
Contour Interval 5 ft.
Shows subdivision and engineering development with boundary lines and contours.


GOLDEN GATE NATIONAL
RECREATION AREA A
CALIFORNIA
Scale 1:2400 Contour Interval 40 ft.
Shows highway at engineer scale
with steep relief.
400
400
400


GOLDEN GATE NATIONAL
RECREATION AREA B
CALIFORNIA
Scale 1:2400 Contour Interval 40 ft.
Shows contours in steep terrain.
800
600
100


GOLDEN GATE NATIONAL
RECREATION AREA C
CALIFORNIA
Scale 1:2400 Contour Interval 40 ft.
Shows wave effects in beach and recreation area study with varying relief.



GOLDEN GATE NATIONAL RECREATION AREA D CALIFORNIA

Scale 1:2400 Contour Intervals 40 ft.

Shows marina, pier and beach area in a recreation study at engineering scale.